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Formal Thought Disorder in Schizophrenia and Mania

By

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Abstract

Formal thought disorder (difficulty in verbal communication) is often found among schizophrenics and manics. Three commonly used methods of assessing formal thought disorder are the Scale for Assessment of Thought, Language and Communication (TLC), the Thought Disorder Index (TDI) and the Scale for Evaluating Bizarre Idiosyncratic Thinking (BIT). It was suggested that the scales differ in what they measure along three dimensions: form of speech, content of speech and verbosity. An issue which has been recently addressed involves the relationship between formal though disorder and attentional deficits. The present study sought to determine the relationships between the three scales along form, content and verbosity, and between formal thought disorder and attention. Subjects were nine patients recruited from an inpatient psychiatry unit. The digit span distraction task (to assess attention), a structured interview (to rate the TLC), three Rorschach cards (to rate the TDI) and the Gorham Proverbs Test (to rate the BIT) were administered to each subject. Comparisons between the scales yielded several trends in the data, though none of the relationships were statistically significant. Associations were found between form of speech between the TDI and TLC, and betweer the TLC and BIT. An association was also found between verbosity on the TDI and BIT. The comparisons between attention and thought disorder showed negative associations between attention and form and attention and content as assessed by the TLC, TDI and BIT. That is, poor attention was associated with high ratings of thought disorder for the dimensions of form and

content. However, a positive association was found between attention and total score on the TLC and TDI. Poor attention was associated with low total thought disorder ratings. The findings of this study indicate that there is some validity to dividing thought disorder into several dimensions, but the dimensions may need to be modified from their present form.

Formal Thought Disorder in Schizophrenia and Mania

The speech of schizophrenics is often difficult to comprehend. Bleuler (1911/1950), the originator of the term schizophrenia, referred to a "loosening of associations" commonly found among his patients which was thought to be central to schizophrenia. This difficulty in verbal communication is known as formal thought disorder. Formal thought disorder refers to deficits in the manner in which thoughts are conveyed. It differs from thought disorder, which refers to inappropriate content of thought, such as delusional ideas. By improving the understanding of formal thought disorder, the understanding of psychosis will also be improved. Questions to be addressed, for example, include which diagnostic groups exhibit which specific behavioral problems? Also, researchers have recently debated whether formal thought disorder is a disorder of thought or of speech (Chaika, 1982; Lanin-Kettering & Harrow, 1985). The findings of this study may begin to address this debate.

The Measurement of Formal Thought Disorder

There are several different methods of assessing formal thought disorder. The three most commonly used instruments make ratings based on common clinical observations. They are: (1) Scale for the Assessment of Thought, Language and Communication (TLC) (Andreasen, 1979c); (2) Thought Disorder Index (TDI) (Johnston & Holzman, 1979); and (3) Scale for Evaluating Bizarre Idiosyncratic Thinking (BIT) (Marengo, Harrow, Lanin-Kettering, & Wilson, 1986).

The TLC was developed by Andreasen (1979c) to provide a common set of definitions rating thought disorder among psychiatric patients. Andreasen (1986) recommends that ratings on the TLC be made using a structured interview, which should address such areas as the subject's interests, politics, and religion. Andreasen (1979c) states that ratings can also be made following an evaluative psychiatric interview. Sometime during the course of the interview, the subject should be allowed to speak for as long as possible. Subjects should also be interrupted, to observe their subsequent behavior.

The TLC consists of 18 traditional clinical subtypes of disordered thought. Descriptions of the subtypes are presented in Table 1.

Insert Table 1 about here

An example of poverty of content of speech as defined by the TLC is:

> Interviewer: "Tell me what you are like, what kind of person you are." Patient: "Ah one hell of an odd thing to say perhaps in these particular circumstances, I happen to be quite pleased with who I am or how I am and many of the problems that I have and have been working on I have are difficult for me to handle or to work on because I am not aware of them as problems which upset me personally. I have to get my feelers way out to see how it is and where that what I may be or seem to be is distressing, too painful or uncomfortable to people who make a difference to me emotionally and personally or possibly on an economic or professional level." (Andreasen, 1979a, p. 1318)

Examples of poverty of speech are:

> Interviewer: "Do you think there's a lot of corruption in the government?" Patient: "Yeah."
> Interviewer: "Were you working at all before you came to the hospital?" Patient: "No."

Interviewer: "How far did you go in school?" Patient: "11th grade."

An example of derailment is:

Interviewer: "What did you think of the whole Watergate affair?" Patient: "You know I didn't tune in on that, I felt so bad about it. I wonder how the Cubs are going to do this year."

Below is an example of incoherence:

Interviewer: "Why do you think people believe in God?" Patient: "Um, because making a do in life, Isn't none of that stuff about evolution guiding isn't true anymore now. It all happened a long time ago. It happened in eons and eons and stuff they wouldn't believe in him." (Andreasen, 1979a, p. 1319)

The following is an example of a tangential response:
Interviewer: "What city are you from?" Patient: "Well, that's a hard question to answer because my parents...I was born in Iowa, but I know that I'm white instead of black so apparently I came from the North somewhere and I don't know where, you know, I really don't know where my ancestors came from." (Andreasen, 1986, p. 476)

As a final example, a statement that would be scored as illogical is:

> "Parents are the people that raise you. Anything that raises you can be a parent. Parents can be anything, material, vegetable, or mineral that has taught you something. Parents would be the world of things that are alive, that are there. Rocks, a person can look at a rock and learn something from it, so that would be a parent." (Andreasen, 1979a, p. 1320)

Andreasen (1979b) has suggested two clusterings of formal thought disorder subtypes that may have significance in diagnosis. Poverty of speech and poverty of content of speech commonly occur in chronic schizophrenics, and they "convey a sense of intellectual emptiness and apathy" (Andreasen, 1979b, p. 1328). Andreasen has labelled this as negative thought disorder. Pressure of speech, tangentiality, derailment, incoherence, and illogicality tend to occur more commonly in manics and

acute schizophrenics. These subtypes convey "an abundance of t' oughts and ideas that are flowing too quickly" and are "associated with intact or excessive affect" (Andreasen, 1979b, p. 1328). Andreasen has labelled this cluster of subtypes positive thought disorder. Negative thought disorder seems to be associated with poor prognosis, while positive thought disorder is associated with good prognosis (Andreasen, 1979b).

Johnston and Holzman (1979) originally developed the TDI, which has since been revised by Solovay et al. (1986). Ratings on the TDI are made from verbatim transcripts taken from subjects' responses to the Rorschach test and the verbal subscales of the Wechsler Adult Intelligence Scale (WAIS). The Rorschach is a projective psychological test, in which subjects are shown an ambiguous inkblot and asked to tell what they see. The WAIS is a standardized test consisting of six verbal and five nonverbal tasks, which measure the subject's intellectual functioning at the time of administration.

The TDI organizes instances of disordered thought into four levels: 0.25, 0.50, 0.75 and 1.0. The four levels reflect a continuum of severity. Responses scored at the 0.25 level reflect minor cognitive slippages which may be exhibited by normals. Responses at the 0.50 level are characteristic of a questionable contact with reality and a distinct oddness. At the 0.75 level, responses are clearly disordered, and have been associated with psychotic episodes by clinicians. Responses at the 1.0 level reflect a complete loss of contact with reality. Each level is composed of several

categories, which are in turn composed of subcategories. Descriptions of the categories are given in Table 2.

Insert Table 2 about here

Holzman, Shenton, and Solovay (1986) have suggested that the categories be grouped into four factors. Associative looseness encompasses: inappropriate distance, flippant responses, clanging, perseveration, relationship verbalization, looseness and fluidity. Combinatory thinking includes: incongruous combinations, idiosyncratic symbolism, fabulized combination, confabulation, playful confabulations, autistic logic, and contamination. Disorganized responses refer to: vagueness, word-finding difficulty, confusion, and incoherence. The final factor, idiosyncratic verbalizations, includes: peculiar verbalizations and responses, queer responses, absurd responses, and neologisms.

An example of an incongruous combination, scored on the Rorschach, is:

> "Like two animals having their nose tied together." (Solovay, 1986, p. 490)

Below is an example of fluidity, as exhibited by a response to the Rorschach:

> "Two people...one minute this appears like their eyes and the next this appears like their entire body holding on. This looks like a picture of, hmmmm. Oh, at first it looked like a picture of, but I lost that one, so it doesn't look like that anymore." (Solovay, 1986, p. 493)

Below is an example of autistic logic, scored from the Picture Completion task of the WAIS:

> "I don't see any sails on this ship, so I would say we don't have anyone operating this ship. I see something rather like an appendix. (What made it look like an appendix?) Looked to me totally useless, then I thought of the appendix." (Solovay, 1986, p. 495)

An example of fragmentation, scored from the Rorschach, is:

> "A masquerade party costume. Cha cha. Clap hands. Let's dance. Partly the color...partly the contour of the...that's a dance." (Solovay, 1986, p. 492)

An example of an absurd response, scored from the WAIS, is:

> Interviewer: "What is the 'Apocrypha'? Patient: "Is that the emancipation and proclamation?" (Solovay, 1986, p. 492)

A score is assigned to each instance of thought disorder. The subcategories are not meant to be scored themselves, but rather are intended to serve as heuristic guides for the raters. The recommended procedure for research purposes is for raters to be blind to the subject's diagnosis, but aware of his or her educational level, social class, and ethnic background, because these may affect the appropriateness of a given response. In addition, each instance of cognitive slippage warrants a thorough inquiry by the interviewer so that the subjects may clarify their responses.

The BIT was developed by Marengo, Harrow, Lanin, and Wilson (1985). Bizarre idiosyncratic thought is defined as "unique to the particular subject, deviant with respect to conventional social norms, and frequently hard to understand, or to empathize with, in the context from which the response arose" (Marengo & Harrow, 1985, p. 498). Verbalizations are elicited from subjects by the Comprehension Subtest of the WAIS (previously described) and the Gorham Proverbs Test. The Gorham Proverbs Test consists

of 12 proverbs which are read to the subject, who is asked to explain their meaning.

The BIT organizes disordered thought into five categories and 11 subcategories, which are listed in Table 3. These categories are provided as a guide for the raters. They were not intended to include every instance of disordered thought. If a subject exhibits an odd verbalization that does not fit into any of the categories, it is still scored.

Insert Table 3 about here

Examples of responses scored at each category are given below.

A response scored as a strange verbalization is:

> Q: Why should we keep way from bad company?
> A: They produce an aura of ill-effect. They're not--you shouldn't be 'subseeded' or deceited by people who are bad. They're just no good. (Marengo, 1986, p. 450)

A response scored as peculiar logic is:

> Q: Strike while the iron is hot.
> A: I could mean Hercules! I saw the movie Hercules and it means don't strike anybody before you cast the first stone. (Marengo, 1986, p. 498)

An example of intermingling personal associations is:

> Q: Rome was not built in a day.
> A: It's love. I have to work hard towards love and love has to work towards me. And this has to gradually come. (Marengo, 1986, p. 450)

An example of a lack of relationship between question and response is:

> Q: One swallow doesn't make a summer.

> A: Boy, that's greedy as hell, man, that's real greedy. That's like pulling my actual backwards. (Marengo, 1986, p. 450)

These three methods of assessing formal thought disorder differ on several dimensions. An obvious difference is their methods of eliciting verbal production. The TLC, using an interview format, is the most unstructured of the three. Both the TDI and the BIT use standardized psychological tests such as the Rorschach, the verbal subscales of the WAIS, and the Gorham Proverbs Test.

The methods of eliciting verbal production reflect what each scale was designed to measure. The TLC was developed to assess the types of disordered thought that occur in the context of a clinical interview. Many of the subtypes are not exhibited except in the context of an interview. For example, tangential responses can only be exhibited if a question has been asked. Responses given in other contexts, such as responses to the Rorschach test, may not be scorable using the TLC. For example, the following response to a Rorschach is scored as disordered on the TDI, but would not be scored on the TLC. Patient: "I'm afraid of what else is could be...it scares me to think of what else it could be...overpowering" (Solovay, 1986, p. 485).

The verbal subtests of the WAIS were selected to elicit verbal production for the TDI because they allow examination of the process by which a subject arrives at an answer. The Rorschach test calls for a personal interpretation of an abstract situation, and requires the processes of organization and regulation. It is possible to determine faulty reasoning, failure to focus or attend in appropriate ways, and unusual

concept formation from a subject's responses. Several of the categories of the TDI are exhibited only by responses to the Rorschach test. These include incongruous combinations, idiosyncratic symbolism, fabulized combinations, and confabulations. A more unstructured method of sampling speech, such as an interview, may not tap all of the dimensions of disordered thought measured by the TDI. For example, the following sample of speech is scored as distractibility on the TLC, but would not be scored on the TDI: "Then I left San Francisco and moved to...Where did you get that tie? It looks like it's left over from the fifties."

The Gorham Proverbs Test and the Comprehension Subtest of the WAIS were chosen to elicit verbal production for the BIT because they were found by Marengo et al. (1986) to be satisfactory in evoking thought-disordered speech in subjects that possess that potential. They require the subject to address abstract concepts, and make decisions of social comprehension and judgment. They were also chosen because of their ease of administration. The Rorschach test can be used, but takes longer to administer and is more difficult to transcribe.

The scales differ not only on method of eliciting verbal production, but also on what they measure. These differences may be conceptualized as dimensions of formal thought disorder. One dimension is amount of verbal production. A measurement of this is included only on the TLC. Berenbaum, Oltmanns, and Gottesman (1985), using a modified TLC, found evidence for this dimension in a study of formal thought disorder among schizophrenics and their twins. Through factor analysis, four TLC categories were

associated with what Berenbaum et al. termed verbosity. These categories included: pressure of speech, circumstantiality, loss of goal, and poverty of speech. Scores on the verbosity scales were found to be familially influenced, while other factors were not. (Berenbaum et al., 1985). This finding lends support to distinguishing amount of verbal production as a separate dimension.

A second dimension of formal thought disorder is form of speech. Form of speech refers to the manner with which something is said, and does not include the content of the message. Berenbaum et al., using a modified TLC, also found support for this dimension of formal thought disorder. Three TLC categories were found to reflect discontinuities in form of speech. These categories were: non sequitur responses, incoherence, and derailment. Several other TLC categories, such as tangential responses, may also be measurements of form of speech. The TDI also includes categories which measure form of speech, such as fragmentation and incoherence. Subcategories of the BIT which measure form of speech include "strange verbalizations" and "lack of shared communication."

A third dimension of formal thought disorder is content of speech. Disorders of this dimension refer to instances in which the content of the message conveyed is peculiar. Thus, delusional or unconventional ideas may be included under content of speech. Each scale contains categories which may be said to assess this dimension, such as poverty of content of speech and illogicality (TLC), flippant responses, vagueness, incongruous combinations, and fluidity (TDI), and "responses involving coherent but odd

ideas" and "responses that are deviant with respect to social convention" (BIT).

The three scales each appear to measure a variety of different things, and they differ in how much of each of these things they measure. The TLC focuses more on form of speech. Of the 18 TLC categories, 12 assess form of speech (distractible speech, tangentiality, derailment, incoherence, clanging, word approximations, circumstantiality, loss of goal, perseveration, echolalia, blocking, and stilted speech), while only four categories assess content of speech (poverty of content of speech, illogicality, neologisms, and self-reference). The TDI focuses more on content than on form. Fifteen of the 23 categories of the TDI reflect content (inappropriate distance, flippant responses, vagueness, incongruous combinations, relationship verbalization, idiosyncratic symbolism, queer responses, confusion, fabulized combinations, playful confabulations, fluidity, confabulations, autistic logic, contamination, and neologisms), while only eight categories assess form of speech (peculiar verbalizations, word-finding difficulty, clangs, perseveration, looseness, fragmentation, absurd responses, and incoherence). The BIT has an equal number of categories which measure content or form--five of the 11 assess form (strange verbalizations, lack of shared communication, overelaborated response, attending to a part of rather than the whole question, and lack of relationship between response and the question asked), and five assess content (coherent but odd ideas, deviance with respect to social convention, peculiar or idiosyncratic reasoning or logic, confused or disorganized

ideas, and intermingling of personal concerns or associations into the response).

It is important to understand the differences between the three scales for several rea[illegible]. Researchers may obtain conflicting results when studying thought disorder using different scales. These conflicting results may relate not only to differences between diagnostic groups, but also to the relationship between thought disorder and other variables, such as attention. In addition, it may be difficult to understand findings on thought disorder without also understanding the scale used and its objectives. An example of this problem may be found in the recent debate between Berenbaum, Oltmanns and Gottesman (1988) and Matthysse and Holzman (1988). Matthysse and Holzman argue that Berenbaum et al. (1985), by focusing on form of speech, did not measure thought disorder. A number of issues are important to this debate, including the conceptualization of formal thought disorder (i.e. content vs form), different methods of measuring formal thought disorder, and how those methods should be used. No empirical studies have, however, addressed these issues.

Formal Thought Disorder Among Schizophrenics and Others

The three scales described above have been used to examine formal thought disorder among schizophrenics, other diagnostic groups, and normals. Diagnostic groups other than schizophrenics also exhibit formal thought disorder. However, significant qualitative differences have been found among different diagnostic groups. These findings will be discussed below.

Several categories of the TLC are capable of distinguishing among schizophrenics, normals, and other psychiatric groups. Schizophrenics have been tested at both the acute and post-acute phases. During the acute phase, psychotic symptoms, such as hallucinations and delusions, are prominent. During the post-acute phase, some psychotic symptoms may persist, but they are not accompanied by strong affect (American Psychiatric Association, 1987). When tested in the acute phase, schizophrenics exhibited significantly higher levels of derailment (Andreasen & Grove, 1986; Berenbaum et al, 1985; Oltmanns, Murphy, Berenbaum, and Dunlop, 1985), tangentiality (Andreasen & Grove, 1986; Berenbaum, et al., 1985), poverty of speech, poverty of content of speech, incoherence, illogicality, word approximations, perseverations (Andreasen & Grove, 1986), and loss of goal (Oltmanns, et al., 1985) than normals. Schizophrenics have also been shown to have significantly higher global ratings on the TLC than normals (Andreasen & Grove, 1986; Oltmanns et al., 1985; Ragin & Oltmanns, 1987).

During the post-acute phase, schizophrenic thought disorder symptoms are still present (Andreasen & Grove, 1986), and when compared to normals, schizophrenics' responses are still significantly more tangential (Berenbaum et al., 1985).

Manics and schizophrenics have not differed on TLC global ratings during the acute phase (Andreasen, 1979b; Andreasen & Grove, 1986; Harvey, 1983; Oltmanns, et al., 1985; Ragin & Oltmanns, 1987). However, significant qualitative differences have been found (Andreasen 1979b; Andreasen & Grove, 1986; Oltmanns, et al., 1985; Ragin & Oltmanns, 1987). Manics have

consistently exhibited significantly higher levels of pressured speech than schizophrenics (Andreasen 1979b; Andreasen & Grove, 1986; Oltmanns, et al., 1985; Ragin & Oltmanns, 1987). Manics also exhibited more clanging, distractible speech, circumstantiality (Andreasen, 1979b), and loss of goal (Andreasen & Grove, 1986). Schizophrenics were rated higher on poverty of speech and poverty of content of speech (Andreasen 1979b; Andreasen & Grove, 1986).

When tested at the post-acute phase, symptoms of the manics were shown to remit substantially, while the symptoms of the schizophrenics were still present in significant amounts (Andreasen & Grove, 1986).

Significant qualitative differences among psychiatric groups have also been shown using the TDI. Schizophrenics in the acute phase have exhibited higher total TDI scores than normals (Holzman, Shenton, and Solovay, 1986; Solomon, Holzman, Levin and Gale, 1987). When individual categories are examined, significantly higher levels of idiosyncratic thinking, fluidity, and absurdity were found among the schizophrenics (Holzman et al., 1986; Solomon et al., 1987). Schizophrenics also exhibited more autistic thinking, confusion, and disorganized responses (Holzman et al., 1986). Comparisons were not made between normals and post-acute schizophrenics.

When schizophrenics and manics were compared using the TDI, significant differences were also found. Though the diagnostic groups did not differ with respect to total TDI score, schizophrenics in the acute phase showed higher levels of absurdity, confusion, disorganized responses, and idiosyncratic verbalizations than manics (Holzman et al., 1986; Solovay et

al., 1987). Higher scores were also exhibited by schizophrenics on fluidity and autistic thinking (Holzman et al., 1986). Manics, on the other hand, have been shown to exhibit significantly higher levels of combinatory thinking and irrelevant intrusions than schizophrenics (Holzman et al., 1986). Post-acute schizophrenics were not compared to post-acute manics.

Studies comparing schizophrenics to nonschizophrenics (schizoaffectives, manics, psychotic and nonpsychotic depressives, and normals) using the BIT have found schizophrenics to have a higher overall level of disordered thought than nonschizophrenics during the acute phase (Harrow, Silverstein, and Marengo, 1983; Harrow, Lanin-Kettering, and Prosen, 1983; Marengo & Harrow, 1987). When tested during the post-acute phase, schizophrenics continued to exhibit more overall bizarre thinking than both psychotic and nonpsychotic psychiatric patients (Harrow et al., 1983b; Marengo & Harrow, 1987).

The three scales differ in their abilities to distinguish between schizophrenics and other groups. All of the scales were able to distinguish between normals and schizophrenics in the acute phase. The TLC and the BIT distinguished between normals and schizophrenics in the post-acute phase. No comparisons between schizophrenics in the post-acute phase and normals have yet been made with the TDI.

All three of the scales distinguished between acute phase schizophrenics and manics. Post-acute schizophrenics were distinguished from manics by the TLC. Comparisons between post-acute schizophrenics and manics using the other two scales have not yet been made.

By examination of the specific formal thought disorder categories that distinguished between groups, the reported findings can be integrated based on the dimensions described previously. Unfortunately, reports using the BIT did not indicate the specific distinguishing categories. For this reason, the discussion below will describe only the TLC and TDI.

All three dimensions of formal thought disorder (amount of verbal production, form of speech, and content of speech) distinguished between schizophrenics and normals. Amount of verbal production, as measured by the TLC category poverty of speech, distinguished between the two groups, with schizophrenics exhibiting more poverty of speech. Form of speech, as measured by such TLC categories as derailment, tangentiality, and incoherence, and by the TDI categories of disorganized responses and absurd responses, distinguished between the two groups. Content of speech, as measured by the TLC category of poverty of content of speech, and by such TDI categories of fluidity and autistic thinking, distinguished between schizophrenics and normals. In all cases, schizophrenics exhibited more thought disorder than normals.

All three dimensions of formal thought disorder also distinguished between schizophrenics and manics. Amount of verbal production, as measured by the TLC categories poverty of speech and pressure of speech, distinguished between the two groups, manics having higher ratings on pressure of speech and schizophrenics having higher ratings on poverty of speech. Form of speech, as measured by such TLC categories as distractibility and circumstantiality (with manics having higher scores),

and by such TDI categories as disorganized responses and idiosyncratic verbalizations (with schizophrenics exhibiting higher scores), distinguished the two groups. Content of speech, as measured by the TLC category poverty of content of speech (with schizophrenics having higher scores), and by such TDI categories as fluidity and combinatory thinking (schizophrenics scoring higher on fluidity and manics scoring higher on combinatory thinking), distinguished the t.· groups.

Relationship Between Formal Thought Disorder and Attentional Deficits

Schizophrenics have been shown to exhibit attentional deficits on a variety of tasks (Nuechterlein & Dawson, 1984). Attentional deficits are also frequently exhibited by populations at high risk for schizophrenia, such as the first-degree relatives of diagnosed schizophrenics (Nuechterlein & Dawson, 1984). Those tasks on which schizophrenics in both the acute and post-acute phases, as well as high risk populations, perform poorly include: forced-choice span of apprehension, vigilance tasks, serial recall, reaction time crossover, and backward masking. There are other tasks on which schizophrenics perform poorly only during the acute phase, such as the recognition of familiar letters or numbers (Nuechterlein & Dawson, 1984).

Several researchers have hypothesized that attentional deficits underlie schizophrenic formal thought disorder (e.g. Patterson, Spohn, Bogia, and Hayes, 1986; Rochester, 1979). Rochester (1978) suggested that schizophrenics are adequate users of language, but fail to account adequately for listeners' needs. She has hypothesized that this is due to a failure in short-term memory encoding and retrieval operations. The

failure in short-term memory would prevent the speaker from shifting attention rapidly between prior clauses and the clause being produced. As a result, the speaker would be unable to determine what had just been said, and how much information had been revealed to the listener. Therefore, the speaker may fail to provide appropriate referents or ties between clauses in his or her speech. This would cause the listener to have difficulty in comprehending the speech. The difficulty in comprehending speech would be labelled formal thought disorder.

The reason that a relationship between formal thought disorder and attentional deficits among schizophrenics has been hypothesized is that schizophrenics tend to exhibit both problems. However, as has been pointed out by Neale, Oltmanns, and Harvey (1985), most researchers have not correlated these two variables. A heterogeneous group of schizophrenics is compared to controls. The schizophrenic subjects are not divided into thought disordered and non-though disordered, or into those subjects with and without attentional deficits. Studies generally fail to determine whether the schizophrenics that exhibit formal thought disorder also exhibit attentional deficits. Without relating specific overt symptoms of formal thought disorder to attentional deficits, it cannot be assumed that an association exist between them.

Only a few studies (Harvey, Earle-Boyer and Levinson, 1988; Nuechterlein, Edell, Norris and Dawson, 1986; Persons & Baron, 1985) have examined the relationship between formal thought disorder and attentional deficits. In the Nuechterlein et al. study (1986) hospitalized

schizophrenics were assessed for formal thought disorder using the TDI. Attentional deficits were measured with two continuous performance tests and a forced-choice span of apprehension task. Deficits on the attentional tasks were shown to be significantly correlated with disordered thought as measured by total TDI scores.

In the Harvey et al. study (1988) hospitalized schizophrenics and manics were assessed for formal thought disorder using the TLC. Cognitive deficits were measured with a digit-span distraction task and a reality monitoring task. Different correlational patterns between attentional deficits and positive and negative thought disorder were found in the manic and schizophrenic patients.

Persons and Baron (1985) assessed psychiatric inpatients for formal thought disorder using a modified version of the TLC. Two homograph interpretation tasks and a Stroop task were administered to measure cognitive deficits. Although no differences were shown between thought disordered and non-thought disordered patients on the homograph tasks, a significant positive correlation was shown between thought disorder and number of errors on the Stroop task.

There are some fundamental problems with studies such as the above. One problem is the conceptualization of attention as a single unitary construct. It is not entirely clear what is meant when researchers say they are measuring attention. This point was illustrated in a study by Kopfstein and Neale (1972). These investigators administered five tests to schizophrenics that different researchers had said assessed attention.

These tests were: reaction time, size estimation, vigilance, sorting, and a proverbs test. Correlations among the tests were very low. This illustrates that, although all of the tests had been said to measure "attention", they were clearly not all measuring the same thing.

A second problem is relating a cognitive deficit to a single thought disorder score. As described earlier, the different instruments used to assess formal thought disorder each measure different properties of communication and thinking anomalies. For example, it is possible that a cognitive deficit may be related to a form of speech and not to content of speech. This relation might be lost if correlations were made using a single score. For these reasons, it is suggested that specific measures of cognition be related to specific dimensions of the formal thought disorder scales, rather than to total scores.

Goals

There are three major tools for assessing formal thought disorder: (1) TLC; (2) TDI; and (3) BIT. Each scale may differ along several dimensions, but, surprisingly, the relationship between the three has yet to be examined. Only a very few studies have examined the possible relationship between attentional deficits and formal thought disorder (Harvey et al., 1988; Nuechterlein et al., 1986; Persons & Baron, 1985). In all of the studies presented, correlations were found between thought disorder and attentional deficits. However, the relationship between different attentional deficits and the different dimensions of formal thought disorder have yet to be elucidated.

There are three goals of the present study. First, to examine the relationship between the TLC, TDI and the BIT. As noted earlier, this would increase understanding of formal thought disorder, thereby increasing understanding of psychosis. Second, to determine which features of each scale are able to discriminate between manics and schizophrenics. Determining which diagnostic groups exhibit which specific behavioral problems may expand our understanding of these problems, and may also aid in understanding the varied literature on diagnostic differences between schizophrenics, manics and others on formal thought disorder. And third, to determine which attentional deficits, if any, are related to which dimensions of formal thought disorder.

Methods

Subjects

Subjects were hospitalized psychiatric patien[illegible]d from the inpatient psychiatry unit at a general hospital. Th[illegible]ple was composed of 4 schizophrenics and 5 bipolar disorder (manic ph[illegible]) patients. Diagnoses were made by an experienced research psychologist using DSM-III-R criteria, and were based on a structured clinical interview [Structured Clinical Interview for DSM-III (SCID), Spitzer & Williams 1985] and a review of clinical records.

Subjects ranged in age from 19 to 60 (M=40.3, SD=15.76). Four of the subjects were male. All of the subjects were Caucasians. Subjects were tested between the second and thirty-first day of hospitalization (M=9.8, SD=8.87). Informed consent was obtained from all participating patients. The medication status of the patients is described in Table 4.

Insert Table 4 about here

Procedure

Patients were initially screened using the SCID. The following day, patients participated in the remainder of the study. First an attentional task, the digit span distraction task (Oltmanns & Neale, 1975), was completed. This task requires subjects to recall digits read serially, while ignoring intermittent distractor digits. The task took approximately 15 minutes to complete. Patients then participated in the thought disorder portion of the study. Based on the recommendation of

Andreasen and Grove (1986), a structured interview of general topics unrelated to psychiatric disturbance was conducted to rate the TLC. Subjects were then administered Rorschach inkblots to rate the TDI, as suggested by Johnston & Holzman (1979). Based on the recommendations of Hurt (1978, cited in Johnston & Holzman, 1979), three Rorschach cards were administered--one achromatic (Card I), one black and red (Card II), and one chromatic card (Card IX). The three cards administered were selected randomly from each of the three types of cards (achromatic, black and red, and chromatic). Subjects were also administered the Gorham Proverbs test (Form 1) to rate the BIT, as recommended by Marengo et al. (1986). Test administrators were blind to the subjects' diagnoses. This portion of the study took between 20 and 50 minutes, and was recorded on audiotape.

Ratings were made by three undergraduate research assistants, each trained in the use of one of the scales. Ratings were also made by the author, using all three scales. All raters were blind to the subjects' diagnoses. Raters read transcripts of the audiotaped interviews in order to make the thought disorder ratings. TLC ratings were made with audiotapes, in addition to transcripts, so that pressure of speech could be rated. Raters met to resolve disagreements and to obtain consensus ratings. The consensus ratings were used for all statistical analyses.

The initial categories from each of the scales were divided into three dimensions: verbosity, content of speech, and form of speech. The categories were placed in the three dimensions on the basis of previous

research (Berenbaum et al, 1985; Holzman et al, 1986). A word count was also taken to assess the dimension of verbosity for all three scales. The composition of each dimension is described in Table 5.

Insert Table 5 about here

Scores for each dimension were computed by summing the scores of each category included in the dimension. Total thought disorder scores for each scale were also computed. Means, standard deviations, and maximum and minimum scores for each variable may be found in Table 6.

Insert Table 6 about here

The reliabilities of the ratings for content, form, verbosity and total scores of each scale are presented by correlation coefficients in Table 7.

Insert Table 7 about here

Results

In order to assess how the TLC, TDI and BIT are related, the associations between total thought disorder, verbosity, content of speech and form of speech scores for each scale and the analogous scores of the other two scales were examined. To determine whether attention was related to the different dimensions of thought disorder, as well as to the total scores, the associations between them were examined. In order to examine how the variables were associated with one another, subjects were divided into those above and below the median on each variable, and contingency tables were constructed. These tables are presented in Appendices 1-24.

To assess the degree of association between variables, phi coefficients were computed. Tables 8-12 present the phi coefficients for each comparison.

Insert Tables 8 through 12 about here

Table 8 shows the association between verbosity for the TLC, TDI and BIT. When TLC verbosity scores were measured by categories from the scale, a positive relationship was shown with the TDI, but a slightly negative relationship was demonstrated with the BIT. When TLC verbosity was assessed by a word count, negative associations were found with both the TDI and BIT. There was a positive relationship between TDI verbosity and BIT verbosity, as measured by word counts.

The associations for content on the TLC, TDI and BIT may be found in Table 9. Content as measured by the TLC and TDI showed a very small association, in a negative direction. However, there was a positive association between content on the TLC and BIT. A clear negative association was shown between content on the TDI and BIT.

Table 10 presents the associations between the three scales on form of speech. Most surprising is the lack of association between form on the TDI and form on the BIT. The associations between the TLC and the TDI and BIT were both positive.

The associations between total thought disorder scores on the TLC, TDI and BIT are presented in Table 11. There is a weak negative relationship between the TLC and the TDI, while the TLC and the BIT show a strong positive association. There is a negative relationship between the TDI and the BIT.

Table 12 illustrates the associations between attention, total scores, and dimension scores for each scale. The relationships between attention and TLC content and form were both very small, while the relationship between attention and TLC verbosity was clearly negative. THat is, poor attention was associated with high scores on the dimension of verbosity. The relationship with the TLC total score, however, was positive. Poor attention was associated with low total thought disorder on the TLC. The relationships between attention and TDI content and form were very similar, exhibiting a negative relationship. Both TDI verbosity and TDI total score showed a strong positive relationship with

attention. The relationships between attention and BIT content, form and total score were negative. However, the association between BIT verbosity and attention was in a positive direction.

Because of the small sample size, tests of statistical significance were conducted using the Fisher Exact Test. None of the relationships were found to be statistically significant. For that reason, all results must be interpreted extremely cautiously.

Discussion

The results of the present study, because of the small sample size and lack of statistical significance, need to be interpreted very carefully. However, several trends emerge from the data which may answer some of the questions posed concerning formal thought disorder.

First, what is the relationship between the TLC, TDI and BIT? This question was addressed by dividing each scale into several dimensions: form of speech, content of speech and verbosity. Each scale was compared on these three dimensions and on the total thought disorder score.

The relationships demonstrated between the TLC, TDI and BIT on content of thought were not consistent with what had been expected. The association between the TLC and the TDI was very small, in a negative direction. The TDI and BIT also exhibited a negative association. Only between the TLC and the BIT was a positive association found. These results may be explained in several ways. Only one category of the TLC, poverty of content of speech, assessed content. This category may be very different, qualitatively, from the categories of the other scales which measure content of speech. That is, "content" itself may not be unidimensional. For example, poverty of content of speech reflects speech which conveys no clear meaning. This differs very greatly from the TDI category "peculiar verbalizations and responses" or the BIT category "coherent but odd ideas", which also measure content of speech. These categories tend to reflect strange ideas, such as delusions.

Comparisons between the three scales on form of speech yielded some interesting results. A positive relationship was found between the TLC and both the TDI and BIT. This might be expected when one considers that most of the categories of the TLC assess form of speech. No relationship was found, however, between the TDI and BIT on form of speech. This is surprising, because both the TDI and BIT seem to contain adequate measures of form of speech. There are several explanations that may account for these findings. Because of the small sample size, the statistical analyses may have been lacking in power. Therefore, the results may be unreliable. Alternatively, the three different tasks used for each scale (i.e. interview, Rorschach cards and proverbs) may actually elicit very different types of problems. This may also explain some of the above-noted findings. For example, in the context of a structured interview, a subject may reveal dysfunctions in form of speech, whereas in a more free-form task, such as the Rorschach, problems in content of speech may arise.

The associations between verbosity on the three scales were not consistent with the expected relationships. One would expect to find a positive relationship between the three scales when a simple word count was taken. That is, subjects would be consistent in their amount of verbal production between tasks. However, this was not the case. Associations between the TLC and TDI, and the TLC and BIT were negative. The association between the TDI and BIT was positive. As noted above, the different tasks used for each scale may elicit different problems,

and possibly different amounts of verbal production.

The findings of the comparisons between total thought disorder scores for the three scales do not yield any easily interpretable results. The associations between the TLC and the TDI, and between the TDI and the BIT were negative. The association between the TLC and the BIT, however, was positive.

A second question to be addressed is the relationship *between* attention and the dimensions of thought disorder. For each of the three scales, the associations between attention and content and attention and form are very similar. These associations are in a negative direction, which is consistent with what would be expected. That is, the poorer a subject performed on the attentional task, the more thought-disordered they were found to be. However, a positive relationship was found between attention and the TLC and TDI total scores. This would seem to indicate that a subject with poor attention had lower levels of thought disorder.

The findings noted above may provide support for dividing thought disorder into several different dimensions. For example, there was a negative association between the TLC and the TDI on content of speech, while a positive association was found between these two scales on form of speech. The association between TLC and TDI total scores was negative. If different dimensions of thought disorder did not exist, one would expect these three associations to be similar.

The associations found between attention and total thought disorder scores and attention and form and content scores may also provide validity for dividing thought disorder into several dimensions. The finding that attention is negatively associated with content and form scores, while positively associated with total thought disorder scores may indicate that there are different factors contributing to the total scores, and that these factors may be contributing in different amounts. This finding may prove important to future research. For example, previous research by Harvey et al. (1988) found a relationship between the TLC total score and attention as measured by the digit span distraction task. It may be possible that this relationship reflects an association between only one dimension of the TLC and attention. For example, in the present study, a strong association was found between TLC verbosity and attention, while virtually no association was found between TLC form and attention.

Though it seems that there is some validity to dividing the scales into different dimensions, the unclear findings of the present study indicate that some modification of what categories to include in each dimension may be necessary. The dimensions utilized in this study were based on a priori hypotheses. A larger number of subjects would be necessary to perform analyses to determine which categories actually fit within the different dimensions. Several additional analyses could also be conducted with a larger number of subjects. Subjects could be compared on the level of individual categories within each scale. It

would also be possible to examine thought disorder separately between schizophrenics and manics, to determine any possible diagnostic differences. An analysis examining differences between schizophrenics and manics could also reveal whether scales may be associated depending on these diagnostic differences. For example, within manics, the BIT and TLC may be associated, while within schizophrenics they are not.

Despite the lack of statistical significance in the present study, several interesting trends were found. With further research, these findings could be expanded on, and could perhaps yield some important results regarding issues surrounding formal thought disorder and its measurement. This includes determining the relationship between attention and formal thought disorder, assessing differences in formal thought disorder between diagnostic groups and achieving a better understanding of formal thought disorder.

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Table 1

Scale for the Assessment of
Thought, Language and Communication

1) Poverty of Speech: restriction in the amount of spontaneous speech
2) Poverty of Content of Speech: speech adequate in amount but low in information
3) Pressure of Speech: increase in the amount of spontaneous speech
4) Distractible Speech: interruption of a train of discourse, with focus shifted to an external object
5) Tangentiality: replying to a question in a manner not related to the question
6) Derailment: ideas expressed in spontaneous speech are obliquely related to previous speech
7) Incoherance: speech that makes no sense and ignores grammatical and syntax rules
8) Illogicality: overtly expressed reasoning that breaks logical rules
9) Clanging: speech that creates links on the basis of phonological rather than semantic rules
10) Neologisms: uniquely created words with a special meaning
11) Word Approximations: use of old words in a new and unconventional way
12) Circumstantiality: indirect and lengthy speech gets to a goal slowly, if at all
13) Loss of Goal: speech that never reaches logical end points
14) Perseveration: repetition of words, ideas, or concepts to an extreme degree
15) Echolalia: patient repeats whole words or phrases of the examiner
16) Blocking: interruption of a train of speech, with comment from patient that thought is blocked
17) Stilted Speech: excessively pompous or formal speech
18) Self-reference: repeated reference toward self

Note: From "Speech competence in manic and schizophrenic psychoses: The association between clinically rated thought disorder and cohesion and reference performance" by P.D. Harvey, 1983, Journal of Abnormal Psychology, 92, p. 372. Copyright 1983 by the American Psychological Association, Inc.

Table 2

Thought Disorder Index

0.25 Level
1) Inappropriate Distance: inappropriate psychological distance between subject and task, i.e. responses are dictated by personal associations
2) Flippant Response: response displays an absence of seriousness toward the testing situation
3) Vagueness: response conveys no clear meaning
4) Peculiar Verbalizations and Responses: meaning of the response is clear, but the expression itself is unusual
5) Word-finding Difficulty: subject appears to know word but cannot produce it
6) Clangs: verbalization is determined by sound rather than meaning
7) Perseveration: compulsively repeated idea that is inappropriate to a response
8) Incongruous Combinations: continuous details or images are combined into a single incongruous percept

0.50 Level
9) Relationship Verbalization: a previously given response is repeated, or a new response is related to a former response
10) Idiosyncratic Symbolism: interpretation of the meaning of shading or color, or the use of concrete images to represent abstract ideas
11) Queer Responses: responses that reflect disorganization
12) Confusion: subject is not sure what s/he is saying, thinking or perceiving
13) Loseness: response is unrelated or tangentially related
14) Fabulized Combinations, Impossible or Bizarre: perceptions and ideas are inappropriately condensed to violate reality constraints
15) Playful Confabulation: percept is originally related to the inkblot, but the response is over-elaborated
16) Fragmentation: inability to organize and integrate information

0.75 Level
17) Fluidity: subject perceives the world as highly unstable
18) Absurd Responses: response has no relation to the question asked
19) Confabulations: original perception is related to inkblot, but subject then interprets the rest as if it had to belong with original percept
20) Autistic Logic: subject gives explicit statement of faulty thinking or reasoning

1.0 Level
21) Contamination: two separate and incompatible percepts merge into one
22) Incoherence: response is impossible for the scorer to understand in any context
23) Neologisms: invented words

Table 3

Scale for Evaluating
Bizarre Idiosyncratic Thinking

I. Linguistic Form and Structure
   A. Strange verbalizations
   B. Lack of shared communications

II. Content of the Statement
   A. Coherent but odd ideas
   B. Deviance with respect to social convention
   C. Peculiar or idiosyncratic reasoning or logic
   D. Confused or disorganized ideas

III. What is Intermixed Into the Response
   A. Overelaborated response
   B. Intermingling of personal concerns into the response

IV. Relationship Between the Question and Response
   A. Attending to a part rather than the whole question
   B. Lack of relationship between response and the question asked

V. Behavior

Table 4

Number of Subjects Receiving Different Types of Medication*

	Schizophrenics	Manics
Neuroleptics	3	5
Antidepressants	1	0
Lithium	0	5
Antiparkinsonian	2	3

*The medication status of one schizophrenic patient was unknown

Table 5

Categories of Each Scale Included in Dimensions of Thought Disorder

Scale	Dimensions		
	Verbosity	Content of Speech	Form of Speech
TLC	pressure of speech circumstantiality loss of goal poverty of speech total word count	poverty of content of speech	non sequitur responses incoherence derailment
TDI	total word count	peculiar verbalizations and responses incongruous combinations idiosyncratic symbolism autistic logic	looseness vagueness word-finding difficulty incoherence
BIT	total word count	coherent but odd ideas peculiar or idiosyncratic reasoning or logic overelaborated response intermingling of personal concerns into the response deviance with respect to social convention confused or disorganized ideas	strange verbalizations lack of shared communication attending to a part rather than the whole question lack of relationship between the response and the question asked

Table 6

Mean Thought Disorder Scores

	minimum	maximum	M	SD
Digit Span	49.0	97.0	64.0	16.44
Total TLC	2.0	18.0	7.2	5.07
Total TDI	18.7	68.7	39.7	18.61
Total BIT	.5	30.0	8.7	8.94
TLC Verbosity (scale score)	1.0	6.0	2.8	1.75
TLC Verbosity (word count)	275.0	1894.0	823.8	489.46
TDI Verbosity	73.0	459.0	211.9	119.96
BIT Verbosity	262.0	673.0	412.9	145.55
TLC Content	0.0	2.0	.4	.88
TDI Content	0.0	12.5	7.0	5.79
BIT Content	.5	98.0	19.9	32.10
TLC Form	0.0	4.0	1.1	1.45
TDI Form	0 0	18.7	6.9	7.76
BIT Form	0.0	33.5	6.6	11.01

Table 7

Reliability of Ratings For Each Category

	content	form	verbosity	total
TLC	1.00	.82	.83	.84
TDI	.76	.64	--	.84
BIT	-.22	.75	--	.64

Table 8

Association Between Verbosity for TLC, TDI and BIT

	TDI	BIT
TLC (scales)	.50	-.10
TLC (word count)	-.10	-.26
TDI	--	.50

Table 9

Association Between Content for TLC, TDI and BIT

	TDI	BIT
TLC	-.06	.38
TDI		-.50

Table 10

Association Between Form for TLC, TDI and BIT

	TDI	BIT
TLC	.35	.26
TDI	--	0

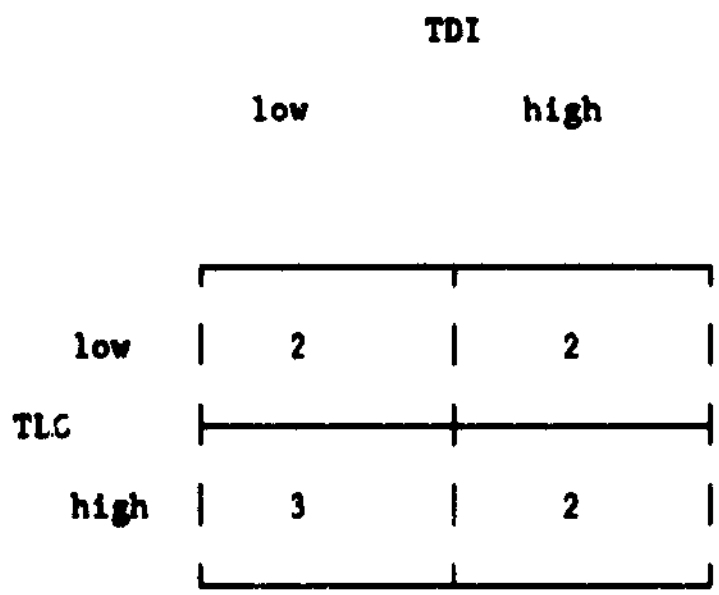
Table 11

Association Between Total Score for TLC, TDI and BIT

	TDI	BIT
TLC	-.10	.50
TDI	--	-.26

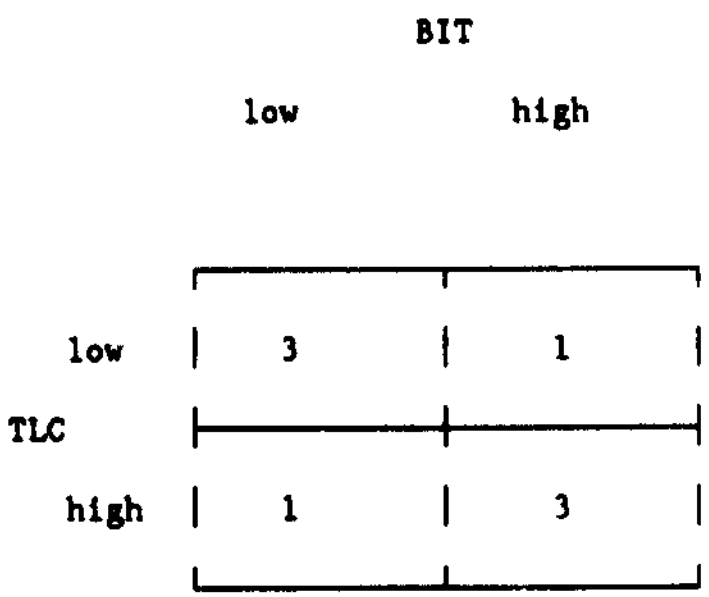
Appendix 1

Comparison of Total Thought Disorder for TLC and TDI



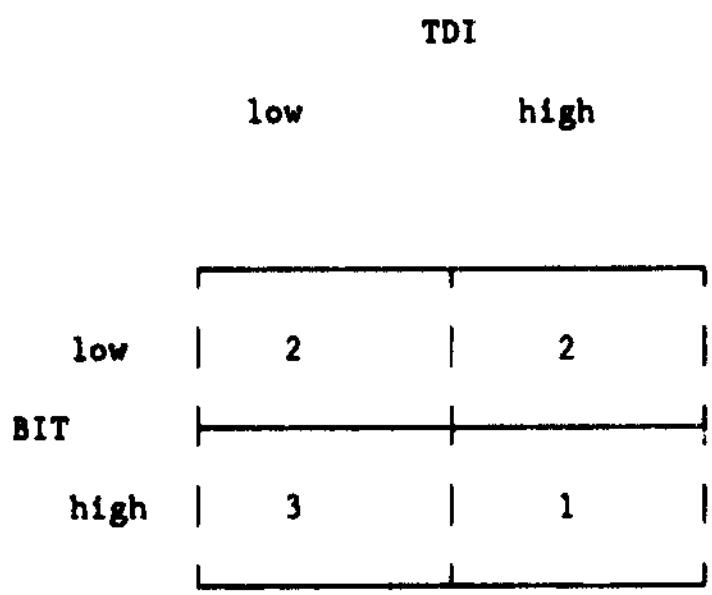
Appendix 2

Comparison of Total Thought Disorder for TLC and BIT



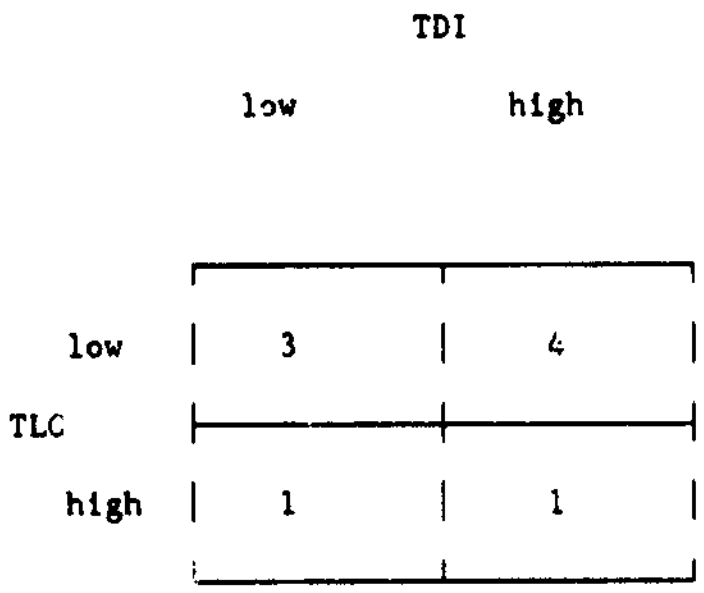
Appendix 3

Comparison of Total Thought Disorder for BIT and TDI



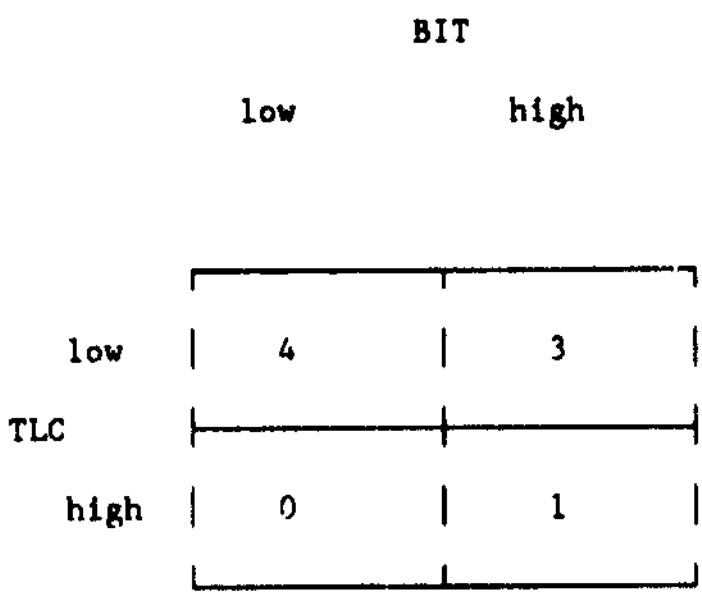
Appendix 4

Comparison of Content for TLC and TDI



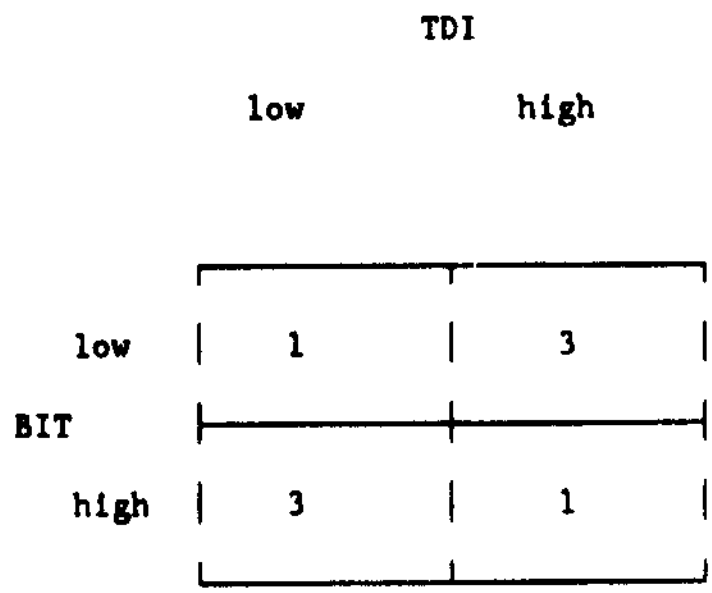
Appendix 5

Comparison of Content for TLC and BIT



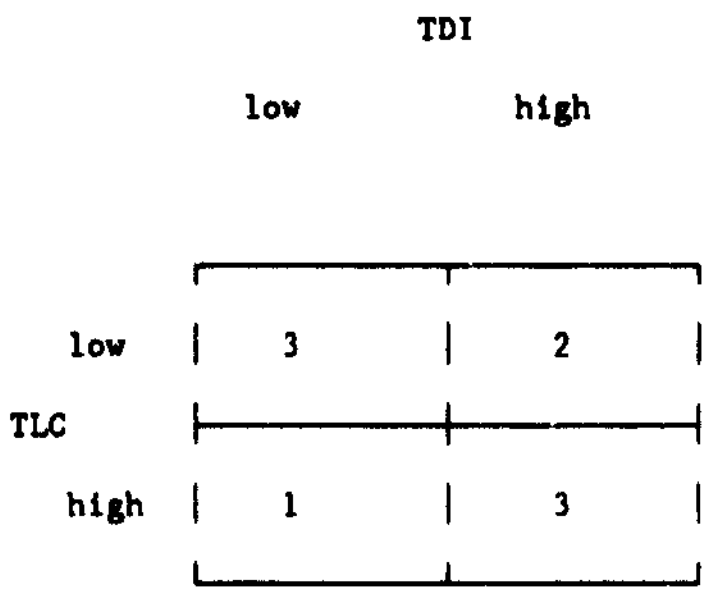
Appendix 6

Comparison of Content for BIT and TDI



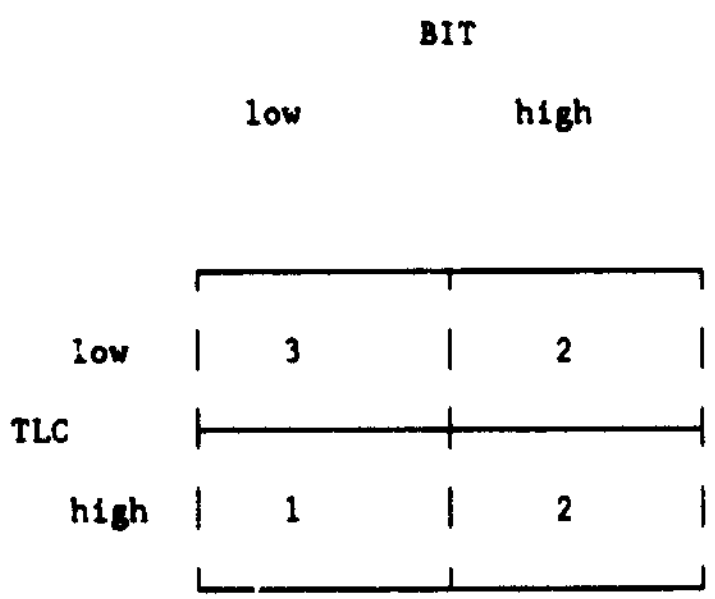
Appendix 7

Comparison of Form for TLC and TDI



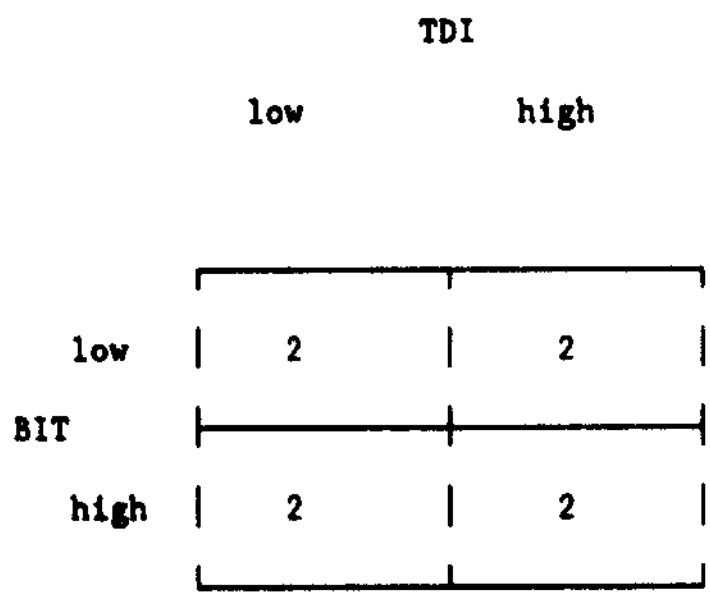
Appendix 8

Comparison of Form for TLC and BIT



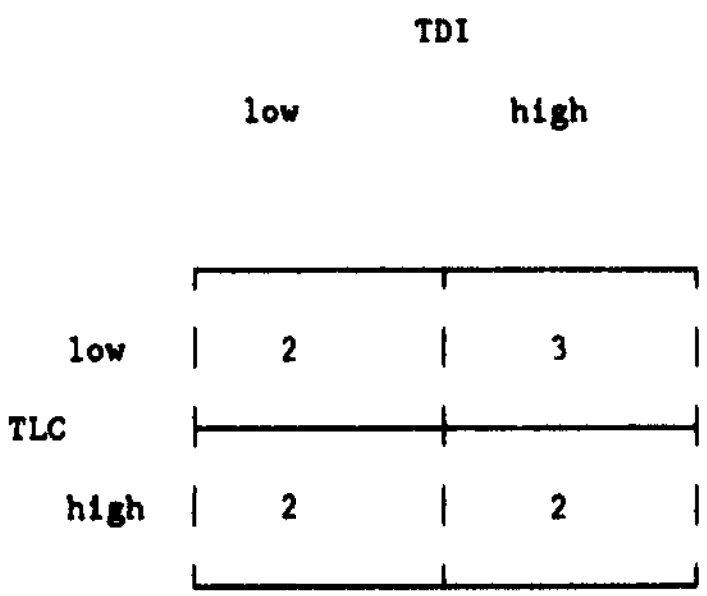
Appendix 9

Comparison of Form for BIT and TDI



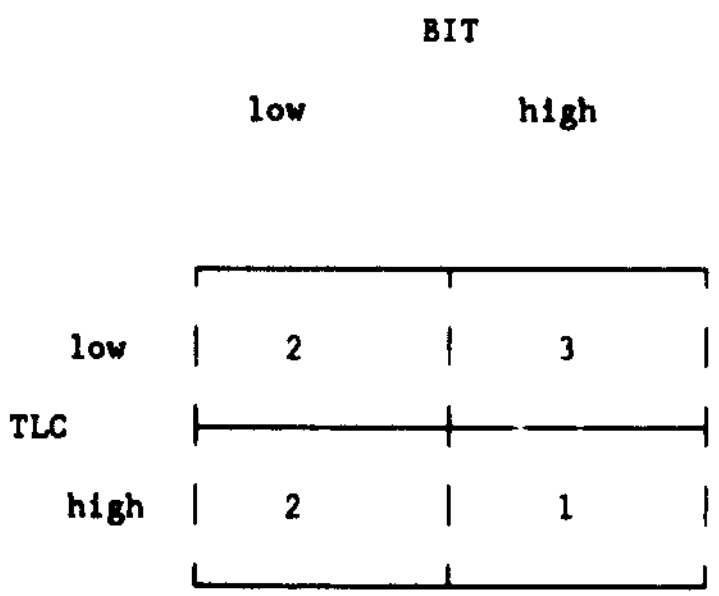
Appendix 10

Comparison of Verbosity for TLC and TDI



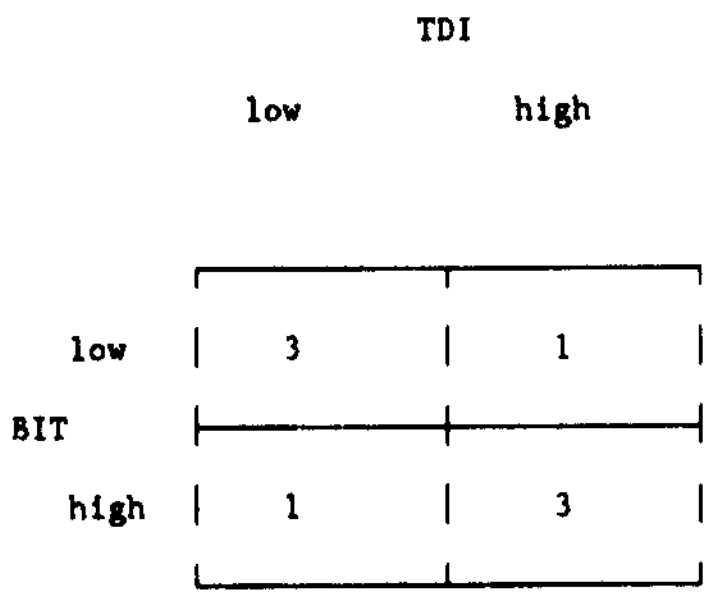
Appendix 11

Comparison of Verbosity for TLC and BIT



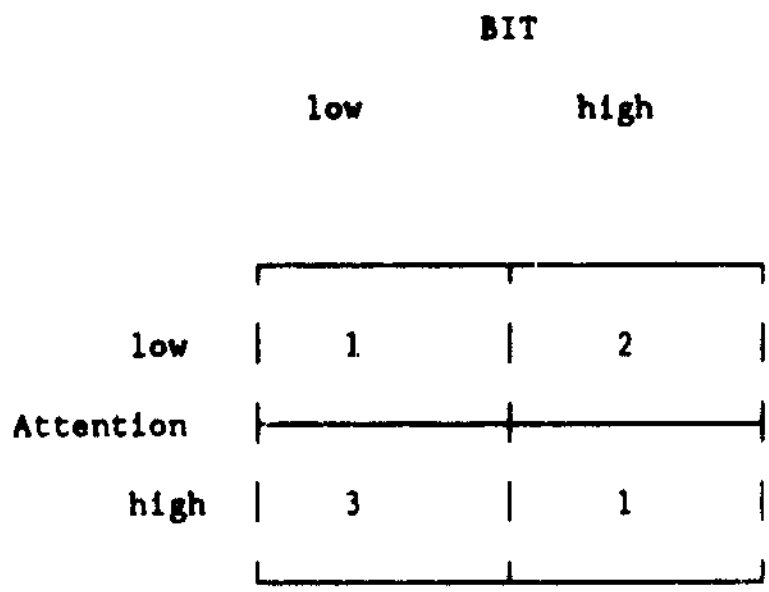
Appendix 12

Comparison of Verbosity for BIT and TDI



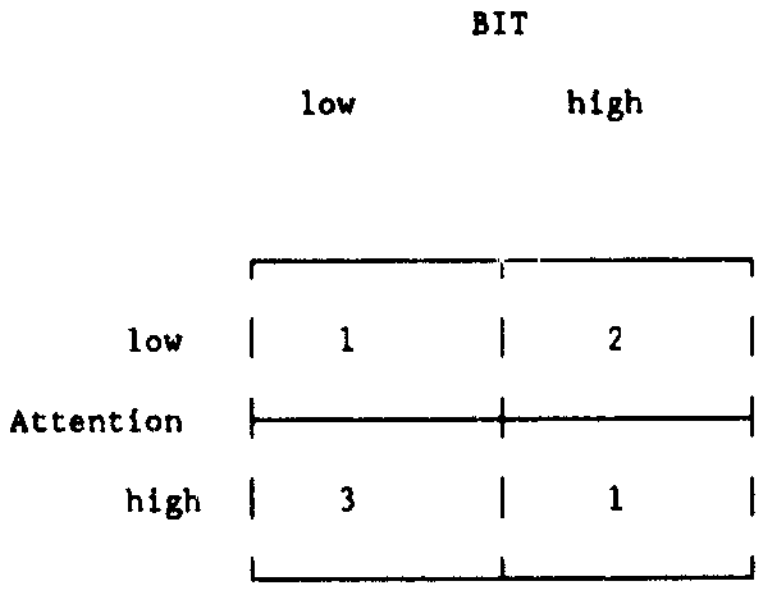
Appendix 13

Comparison of Attention and BIT Total Thought Disorder Score



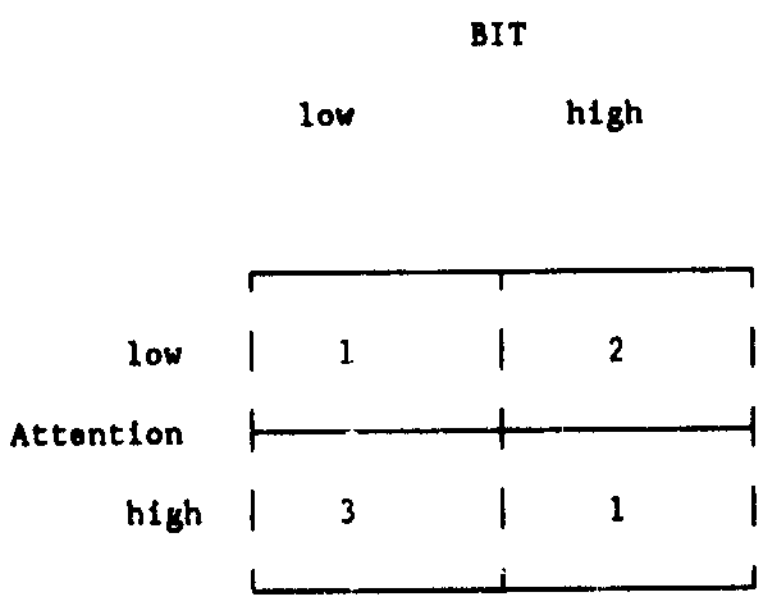
Appendix 14

Comparison of Attention and BIT Content Score



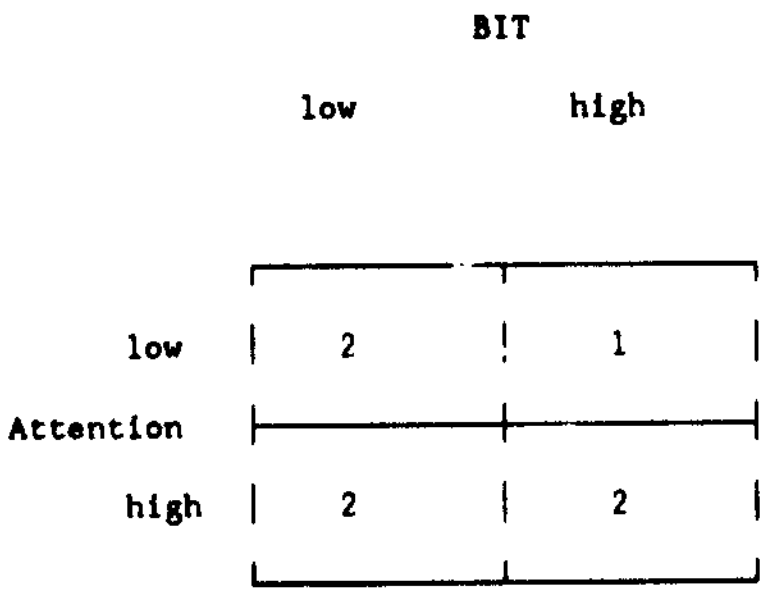
Appendix 15

Comparison of Attention and BIT form Score



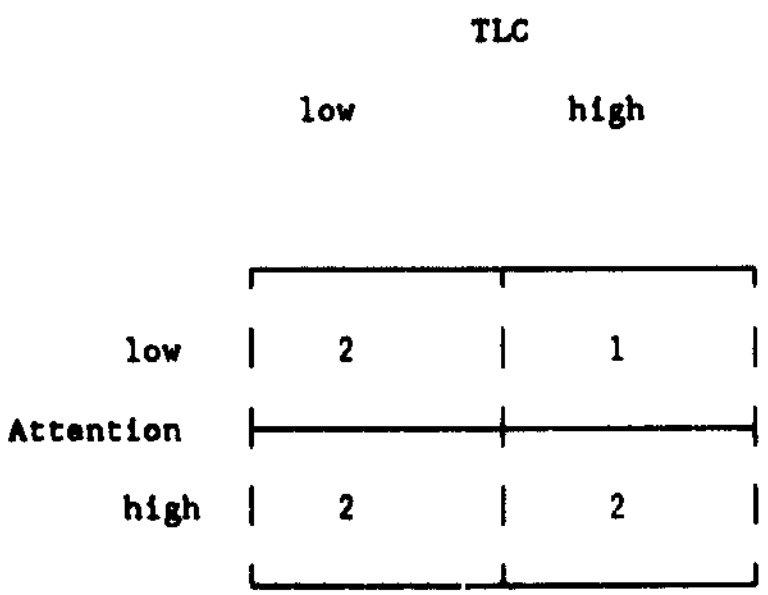
Appendix 16

Comparison of Attention and BIT Verbosity Score



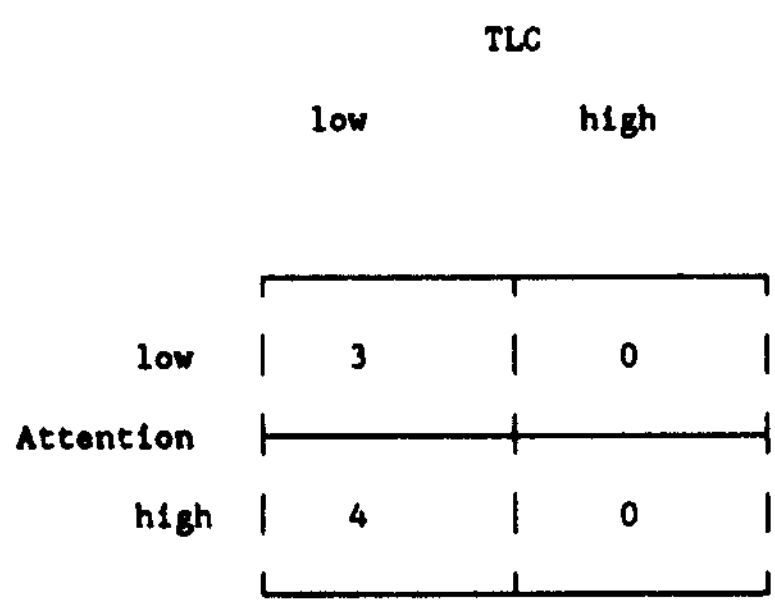
Appendix 17

Comparison of Attention and TLC Total Thought Disorder Score



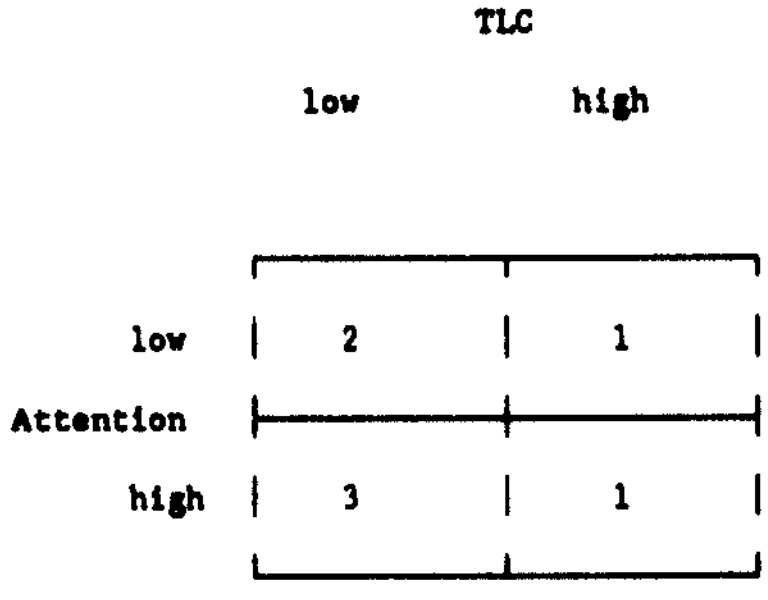
Appendix 18

Comparison of Attention and TLC Content Score



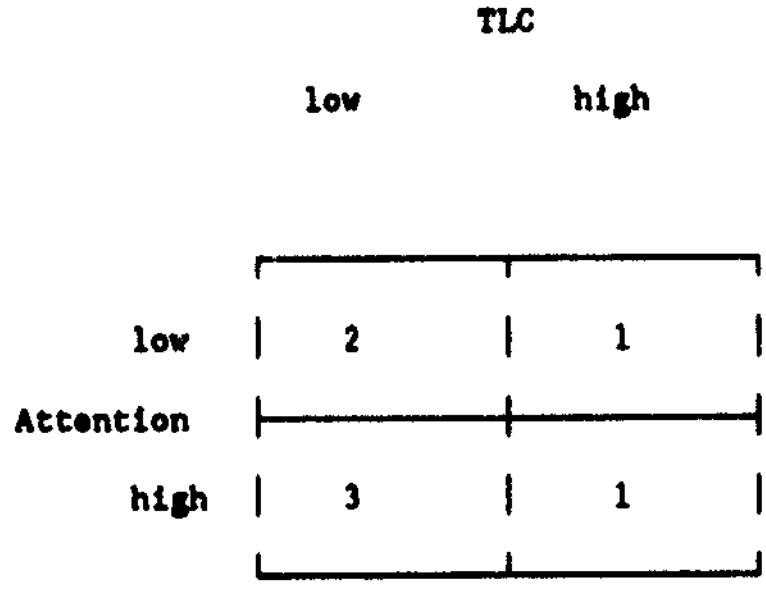
Appendix 19

Comparison of Attention and TLC Form Score



Appendix 20

Comparison of Attention and TLC Verbosity Score



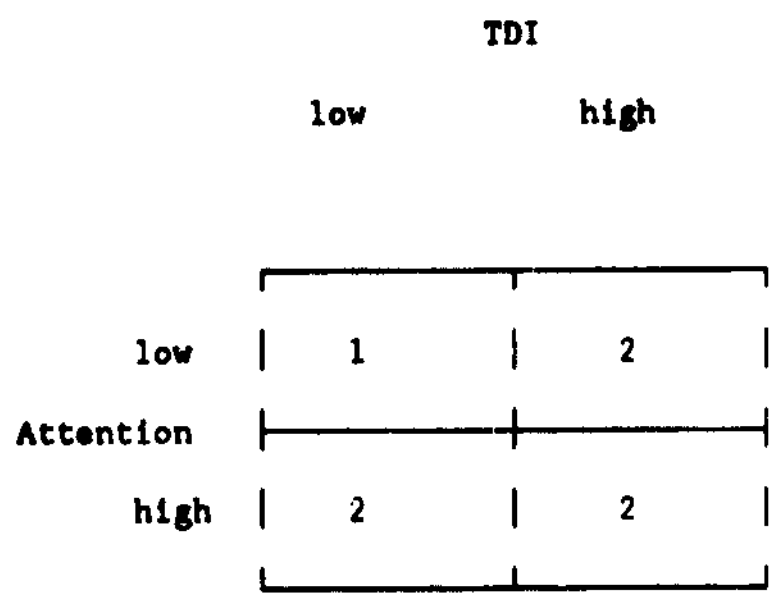
Appendix 21

Comparison of Attention and TDI Total Thought Disorder Score

		TDI	
		low	high
Attention	low	3	0
	high	1	3

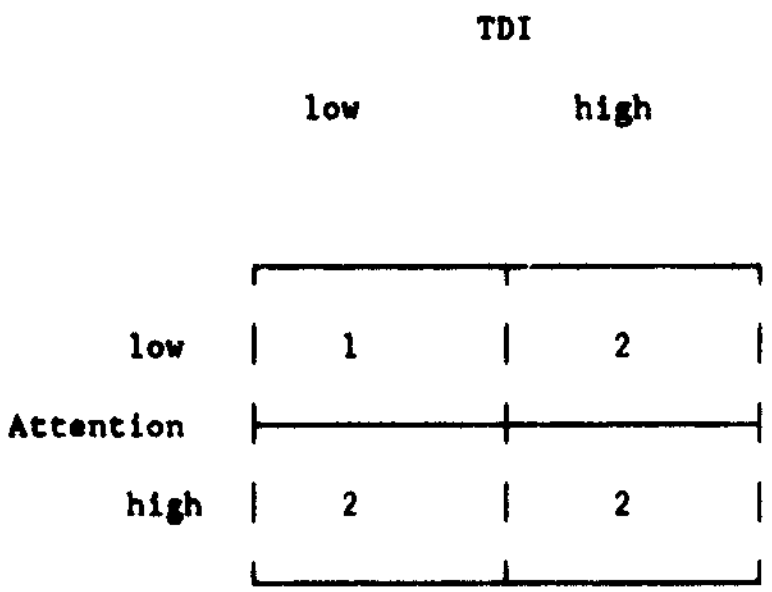
Appendix 22

Comparison of Attention and TDI Content Score



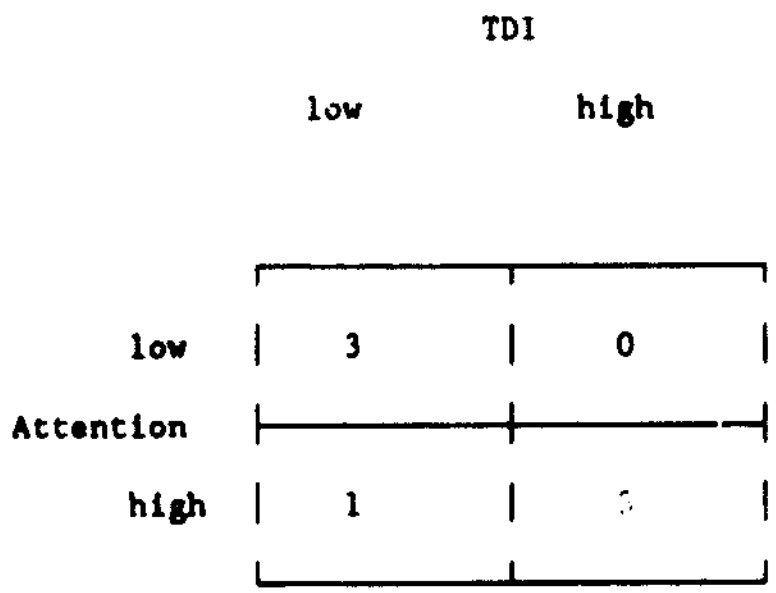
Appendix 23

Comparison of Attention and TDI Form Score



Appendix 24

Comparison of Attention and TDI Verbosity Score



Appendix 25

Comparison of Total Thought Disorder for TLC and TDI